SECTION 8 Systems Analysis and Design

Recommended Prior Knowledge
Students will have used computers for basic word processing, databases and spreadsheet work. They should have covered all previous sections of the syllabus and the relevant aspects of the practical syllabus.

Context
This section should be the eighth section studied by the students. It builds on the knowledge obtained from studying all the previous sections.

Outline
This section describes the approach to the solution of IT problems using systems design and analysis.

Sub section 8.1 Analysis

Section	Learning Outcomes	Suggested Teaching Activities	Online Resources	Other resources
8.1a	Describe different methods of researching a situation, such as: • observation, • interviews, • questionnaires, • examination of existing documentation.	Describe each method and discuss situations when each method is more appropriate than the alternatives for a given situation.	http://www.bbc.co.uk/schools/gcsebitesize/ict/system/1implementingrev2.shtml	(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 3)
8.1b	State the need for establishing the inputs, outputs and processing in both the existing system and the proposed system.	This is just making sure students understand that this must be done not that they have to be capable of doing it.	http://www.school-resources.co.uk/Analysis.htm	(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 3)
8.1c	State the need for recording information about the current system.	Emphasise that without records of the current system it would be very difficult to know what to replace it with.	http://www.bbc.co.uk/schools/gcsebitesize/ict/software/	(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 3)

Section	Learning Outcomes	Suggested Teaching Activities	Online Resources	Other resources
8.1d	State the need for identifying problems with the current system.	This need must be specified.		(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 3)
8.1e	State the need for identifying suitable hardware and software for developing a new system.	Having analysed the existing system students should be encouraged to begin thinking of what the hardware and software requirements of the new system will be.	http://www.bbc.co.uk/schools/gcsebitesize/ict/system/1implementingrev4.shtml	(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 3)
8.1f	State the need for identifying the user and information requirements necessary to resolve the identified problems.	This is just the understanding that having examined all the information which has been collected about the existing system, the user and information requirements of the new system must now be identified.		(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 3)
8.1g	State the need for specifying the required hardware and software.	This can be done at the end of the analysis section or during the design stage.	http://www.bbc.co.uk/schools/gcsebitesize/ict/system/1implementingrev4.shtml	(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 3)

Sub section 8.2 Design

Section	Learning Outcomes	Suggested Teaching Activities	Online Resources	Other resources
8.2a	State the need for producing designs for: • documents, • files, • forms/inputs, • reports/outputs • validation.	It should be explained that before these essential items can be implemented it is necessary to design them.	http://www.bbc.co.uk/schools/gcsebitesize/ict/system/1implementingrev5.shtml	(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 4)
8.2b	Design data capture forms and screen layouts to solve a given problem.	Students should be taught what the best features of these are and how to produce them.	http://www.bbc.co.uk/schools/gcsebitesize/ict/system/1implementingrev5.shtml	(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 4)
8.2c	Design reports layouts and screen displays to solve a given problem.	Students can make use of their practical studies here. Emphasis should be placed on the design and the fact that it is not necessary to use a computer at this stage.	http://www.bbc.co.uk/schools/gcsebitesize/ict/software/	(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 4)
8.2d	Design validation routines to solve a given problem.	Checks should be understood, such as: • length, • range, • invalid character, • format, • presence, • existency, • check digit, • hash totals. Length check is an exact check of length.	http://www.theteacher99.btinternet.co.uk/theteacher/gcse/newgcse/module5/task10.htm	Sargent, & Walmsley, 2003, Chapter 9) (Leadbetter, & Wainwright, 2004, 12.3)

Section	Learning Outcomes	Suggested Teaching Activities	Online Resources	Other resources
		Be careful about misunderstandings that certain sources have. Setting the length and type of a field is not necessarily validation. A length check must be an exact number of characters and should not be confused with length of surname, for example, where the data entered can acceptably be entered when less than the field length. For the sake of this syllabus a spell checker is not a method of validation as it is possible for incorrectly spelt words to still be valid and vice versa.		
8.2e	Design the required data/file structures to solve a given problem.	Make use of the knowledge gained from Practical unit section 3		(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 4)

Sub section 8.3 Implementation

Section	Learning Outcomes	Suggested Teaching Activities	Online Resources	Other resources
8.3a	Identify the different methods of system implementation, such as: • parallel running, • phased implementation, • direct changeover.	Pupils should be taught the correct terminology and the definition of each.	http://www.bbc.co.uk/schools/gcsebitesize/ict/system/1implementingrev6.shtml http://www.theteacher99.btinternet.co.uk/theteacher/gcse/newgcse/module6/task12.htm	(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 5.2)
8.3b	Identify suitable situations for the use of the methods in 8.3a, giving advantages and disadvantages of each.	Examples of the above should be given of which one is appropriate for a particular situation.	http://www.bbc.co.uk/schools/gcsebitesize/ict/system/1implementingrev6.shtml http://www.theteacher99.btinternet.co.uk/theteacher/newalevel/cp1_1_8.htm	(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 5.2)
8.3c	State testing strategies that would be employed in implementing the new system, such as: • the use of normal, • abnormal, • extreme data, • as well as the use of test data, • real/live data.	It is important that students understand the difference between normal, abnormal and extreme data. Simple examples using data for examination scores would be useful. The knowledge should be gained that there is no substitute for the use of live data to test a system.	http://www.theteacher99.btinternet.co.uk/theteacher/gcse/newgcse/others/testing.htm	(Walmsley, et. al., 2004, Chpts 9 & 19) (Leadbetter, & Wainwright, 2004, 7)
8.3d	Identify improvements that could be needed as a result of testing.	Ensure that students realise that testing is not an end in itself. It must lead to improvements in a system being made.		(Walmsley, et. al., 2004, Chpts 9 & 19) (Leadbetter, & Wainwright, 2004, 7)

Sub section 8.4 Verification

Section	Learning Outcomes	Suggested Teaching Activities	Online Resources	Other resources
8.4a	Identify the need for, and the different methods of, verification when entering data.	Get students to compare data in a database with data they have collected on a data capture form visually, highlighting differences. Make sure they understand that verification is the process of checking that data has been copied correctly NOT that it is correct in the first place. Ensure they know about double entry methods used in business applications.	http://www.theteacher99.btinternet.co.uk/theteacher/gcse/newgcse/module5/task9.htm http://www.bbc.co.uk/schools/gcsebitesize/ict/databases/3datavalidationrev3.shtml	Walmsley, et. al., 2004, Chapter 9) (Leadbetter, & Wainwright, 2004, 12.3)

Sub section 8.5 Documentation

Section	Learning Outcomes	Suggested Teaching Activities	Online Resources	Other resources
8.5a	Identify the components of technical documentation for an information system, such as: • program coding, • program flowcharts, • system flowcharts, • hardware and software requirements, • file structures, • list of variables, • validation routines.	Differentiate between the types of documentation which are needed to support a system. Explain who would use technical documentation (a programmer / systems analyst) and why their needs are different to an ordinary user of a system.		(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 8.5)
8.5b	Identify the components of user documentation for an information system, such as: • purpose and limitations, • hardware and software requirements, • how to use the system, • input and output formats, • sample runs, • error messages, • trouble-shooting guide.	Explain why the needs of a user are often simpler than a programmer or systems analyst.	http://www.bbc.co.uk/schools/gcsebitesize/ict/system/1implementingrev6.shtml	(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 8.5)

Sub section 8.6 Evaluation

Section	Learning Outcomes	Suggested Teaching Activities	Online Resources	Other resources
8.6a	State the need for evaluating a new system in terms of the efficiency, ease of use, and appropriateness of the solution.	Remind students that systems analysis and design is a cycle and ends with evaluation which might then become the first stage in the new cycle.	http://www.bbc.co.uk/schools/gcsebitesize/ict/system/1implementingrev7.shtml	(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 7.1)
8.6b	State the need for comparing the solution with the original task requirements.	A good evaluation will always start by comparing the system which has been produced with the original problem and requirements of the solution.		(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 7.1)
8.6c	State the need for identifying any limitations and necessary improvements to the system	This is the point at which faults with the system (**found during the testing stage**) are identified. There should then be suggestions as to how these faults should be rectified.		(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 7.2)
8.6d	State the need for evaluating the users' responses to the results of testing the system.	As well as testing the system with data it is expected that the future users of this system will have the opportunity to test it out and identify problems which the systems analyst might have failed to spot.		(Walmsley, et. al., 2004, Chapter 19) (Leadbetter, & Wainwright, 2004, 7.3)